

Recommendations to Generate a Culture of Innovation in the Colombian Productive Sector

Luz A. Gaviria Roa¹, Harvey Gómez Castillo² and Holman Montiel Ariza³

¹Facultad de Ingeniería, Fundación Universitaria Panamericana, Bogotá D.C., Colombia.

¹ORCID: 0000-0001-5422-282X

^{2,3}Facultad Tecnológica, Universidad Distrital Francisco José de Caldas, Bogotá D.C., Colombia.

²ORCID: 0000-0003-4474-3642 ³ORCID: 0000-0002-6077-3510

Abstract

The objective of this research is to carry out an analysis of the current panorama and the behavior that Colombia has been presenting in terms of innovation, with the perspective of evaluating indicators compiled in diverse sources dedicated to the analysis of the development and performance of innovation ecosystems; that contribute to evaluate the necessity and importance of generating an innovation culture in the organizations, until designing a culture plan that promotes the development of successful technological innovations, the long-term growth in the organizations and the cultural transformation that focuses on the adoption of good practices originating an environment of opportunities to improve productivity and the development focused on strengthening the process of technology and innovation in Colombia.

Keywords: Innovation Culture, Technology and Innovation, Performance, Innovation Strategy, Organizational Culture.

1. INTRODUCTION

The growth of organizations goes hand in hand with the participation of the people who work there, as they are responsible for promoting value through innovation, creativity, teamwork and the fact that they feel involved in the transformation and achievement of specific goals for the organization [1]; in order to pursue competitiveness allowing to assume constant changes in the environment and incursionary or reinvent in order to be at the forefront and not end up disappearing from the market. [2]

This growth must be analyzed from different angles associated with the environment of the innovation culture, i.e. a set of good practices and internal and external elements that contribute to generating collaboration and transversal effort between those involved [3]. According to the methodology developed by Jay Rao and Joseph Weintraub [4-5] it proposes 6 fundamental blocks: Resources, Processes, Values, Behavior, Climate and Success, see Fig. 1; which are broken down into 18 factors and 54 elements that are dynamically linked as the basis of an innovative culture that sustains the organizational strategy, allowing to diagnose the innovative climate and identify opportunities and improvements to activate innovation in the organization.

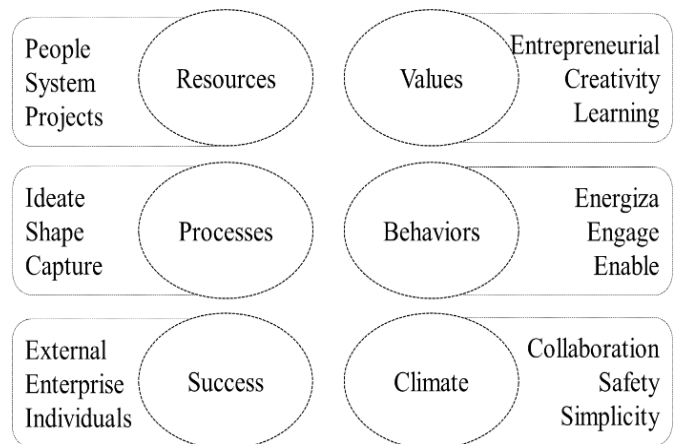


Fig. 1. The six building blocks of an innovative culture

Likewise, the Organization for Economic Cooperation and Development (OECD) in the 4th edition of the Oslo Manual defines innovation as "the implementation of a new or significantly improved product, process, a new marketing method or a new organizational method put into practice in the company" [6]; proposing four types of innovation:

Product: Introduction of a new good or service, or significant improvement to its functional characteristics or its purpose of use.

Process: Is the implementation of a new or significantly improved form of production or physical distribution of internal supply or output.

Marketing: Application of a new marketing method related to changes in the design of product or packaging, prices and location in channels.

Organizational: Is the implementation of new organizational methods such as administrative practices, organizational structure, communication lines, in others.

Thus, arriving at the definition of two great pillars that are catalogued according to the degree of innovation [7-8]; as they are:

Radical innovation: it consists of creating and/or generating something new for the world either in relation to a product or process, which establishes a rupture and makes a great

difference in relation to the established ways of doing things and therefore can be understood as an evolution of what already exists.

Incremental innovation: consists of making improvements over existing technology, i.e. including changes with a low impact on current products or processes; this type of innovation compared to radical innovation incurs a lower type of risk, because in associated issues time and investment are not so high, but in the same way the benefits that can be obtained will not be so high in this type of innovation.

These become key points to consider the amount of strengthening the innovation process and want to guide Colombian organizations towards the generation and establishment of an innovation culture [9].

2. MATERIALS AND METHODS

This document is based on an initial review of different sources associated with innovation in Colombia that measure innovation performance, such as the Global Innovation Index [1-2], the World Economic Forum Competitiveness Report [10-11], the World Science Report published by UNESCO [12], and the Development and Technological Innovation Survey [13], among others [14]; in order to identify the behavior that has been developing and incorporating the different organizations in Colombia in innovation issues and thus to generate a series of recommendations and strategies with respect to the elements that make up the culture of innovation and finally obtain the design of a plan to promote the culture of innovation in business organizations in the country.

3. DEVELOPMENT AND DISCUSSION

According to the results reported in the Global Innovation Index report for 2018 [1], which determines the innovation capabilities and results of the world's economies and evaluates two groups of indicators: Input indicators, which take into account institutions, human capital and research, infrastructure, market sophistication and business sophistication, and Output

indicators, which analyze results in terms of knowledge and technology production and creative production, see Fig. 2.

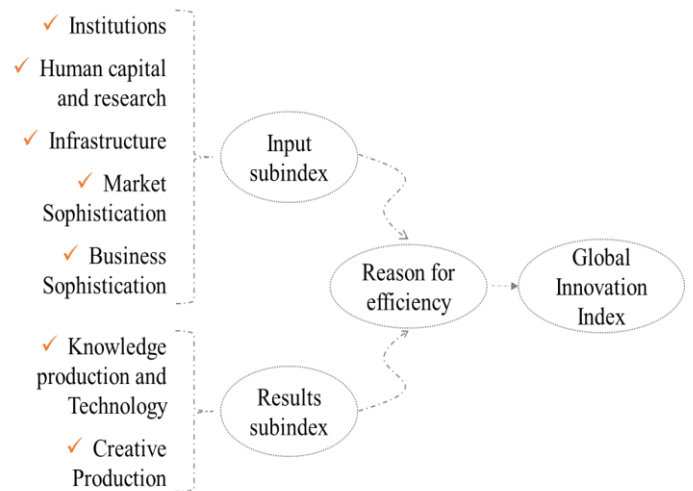


Fig. 2. Structure of the global innovation index

Therefore, the relationship generated between the two indicators is known as the efficiency ratio, through which it is identified how efficient a country is to generate innovation taking as reference two factors, the quality and quantity of inputs used to achieve the results. As can be seen in Fig. 3, the behavior of the efficiency ratio in Latin America, which is no more than the product obtained from the division between the sub-index of results and the sub-index of inputs; it can be inferred that, if the efficiency value is close to or greater than one, the country has a healthy innovation ecosystem. Otherwise, if the efficiency ratio is close to zero [2].

In this order of ideas, the efficiency indicator reported for Colombia is 0.50, which translates into an inconvenience that makes it one of the most inefficient countries when it comes to converting capacities and inputs into effective products or results of knowledge and innovation.

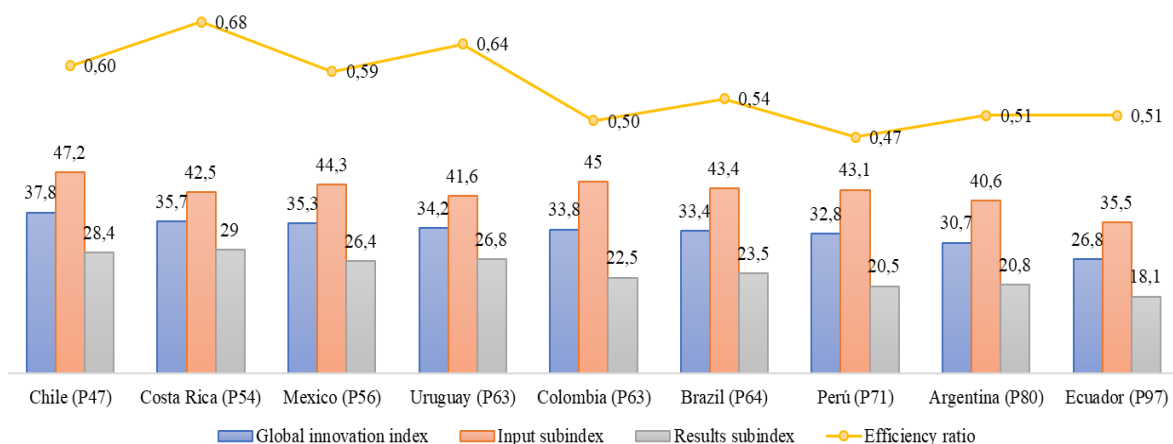


Fig. 3. Efficiency ratio in Latin American countries

Table 1. Performance and outstanding developments of Latin America

Better position	Score	Position		Variation
	2018	2017	2018	17-18
Chile	37,8	46	47	-1
Costa Rica	35,7	53	54	-1
Mexico	35,3	58	56	+2
Uruguay	34,2	67	62	+5
Colombia	33,8	65	63	+2

Worse position	Score	Position		Variation
	2018	2017	2018	17-18
Paraguay	28,7	85	89	-4
Ecuador	26,8	92	97	-5
Guatemala	25,5	98	102	-4
El Salvador	25,1	103	104	-1
Honduras	24,9	104	105	-1

Better variation	Score	Position		Variation
	2018	2017	2018	17-18
Brazil	33,4	69	64	+5
Uruguay	34,2	67	62	+5
Colombia	33,8	65	63	+2
Mexico	35,3	58	56	+2
Chile	37,8	46	47	-1

Worse variation	Score	Position		Variation
	2018	2017	2018	17-18
Panama	32,4	63	70	-7
Ecuador	26,8	92	97	-5
Paraguay	28,7	85	89	-4
Guatemala	25,5	98	102	-4
Argentina	30,7	76	80	-4

For 2018 in the Global Innovation Index for Latin American countries see table 1, the country with the best performance was Chile to occupy the position 47, for the case of Colombia (P63) remained in fifth place at the regional level improving two positions in the world with respect to 2017. However, in terms of variation, only four countries showed an improvement in the scale located as follows: Brazil (+5), Uruguay (+5), Colombia (+2) and Mexico (+2).

Taking as reference the data and analysis previously presented and including the visualization of score and position that

Colombia has had from 2012 to 2018, see Fig. 4; it is seen as Colombia has fallen 1.0 unit according to global rating with respect to IGI 2017, since it goes from 34.8 to 33.8 in a scale that goes from 0 to 100. When having this result the country was placed in 63 position among 126 economies, which recovers two positions with respect to the previous year. Colombia thus ranks at the 50th percentile among the distribution of countries, projecting a regression from the 2014 measurement in which it ranked at the 52nd percentile.

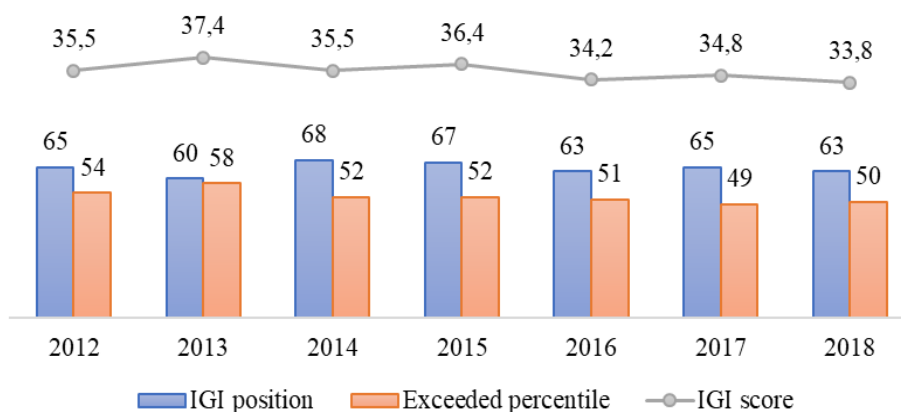


Fig. 4. Colombia's score and position, 2012-2018

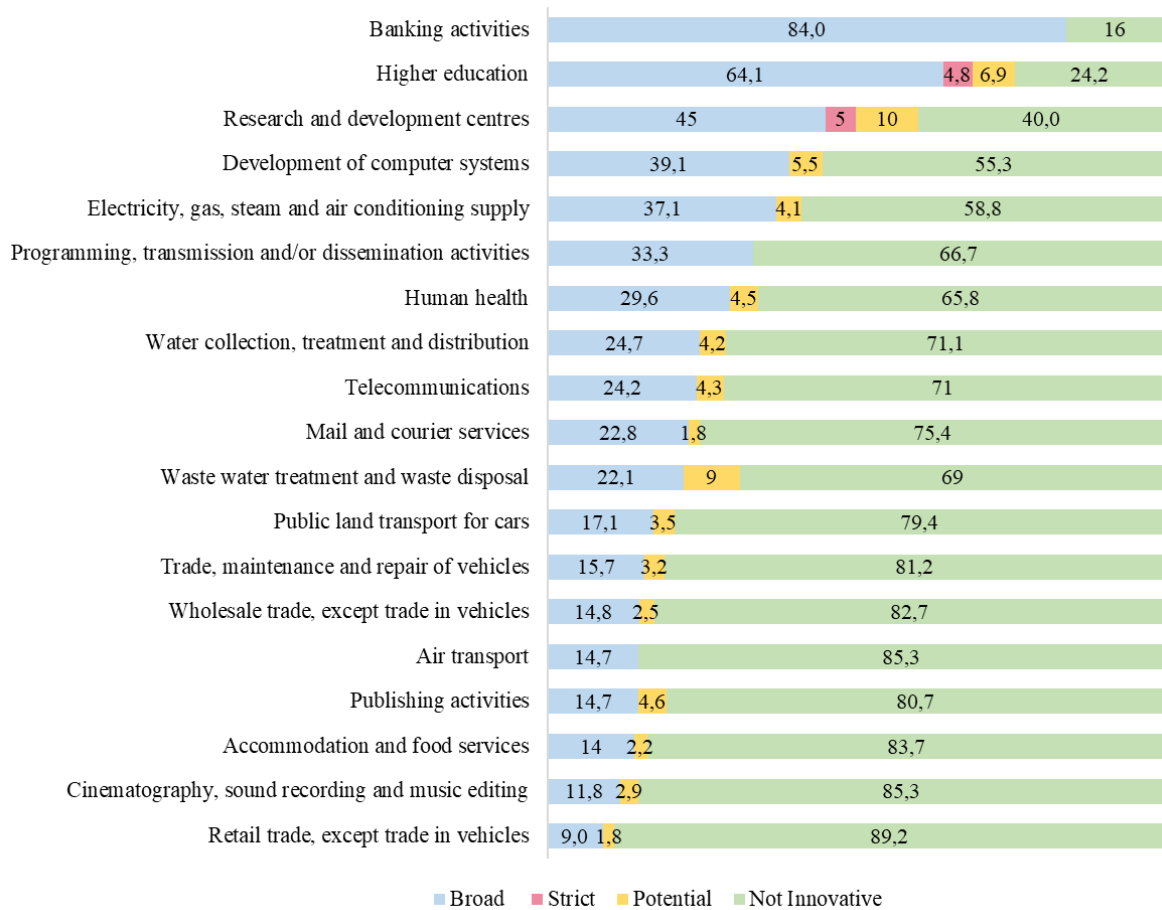


Fig. 5. Percentage distribution of companies according to innovation results, 2016 – 2017

Table 2. Pillar 12: Innovation capability in Latin America

Country	Rank	Score
Mexico	50	42,7
Chile	53	41,3
Argentina	54	40,5
Costa Rica	55	40,4
Panama	66	37,5
Uruguay	70	36,4
Colombia	73	35,5
Ecuador	88	32,0
Honduras	92	31,5
Guatemala	100	30,7
Paraguay	111	28,9
El Salvador	123	26,9

capacity, that is, the quantity and quality of research or the extent to which a country's environment fosters collaboration, creativity and the capacity to generate ideas in new goods and services; it is evident that Colombia ranks 73rd out of 140 countries, see Table 2; for which investment in innovation is 0.7% of Gross Domestic Product (GDP).

The World Science Report published by UNESCO, together with the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) indicates that, although there has been some improvement in the economies in the last decade, Colombia is among the four countries with the highest levels of poverty. The Latin American economy grew by just 1.1% in 2014, which means that in practice per capita GDP stagnated [12]. In spite of having this type of panorama of low viability in economy and innovation; between 2010 and 2014, Colciencias formulated diverse strategies to reinforce the policies of Science, Technology and Innovation, with the purpose of locating Colombia as one of the three most innovative countries of Latin America for 2025, and a world leader in biotechnology; for which the work to develop must be quite strict, planned and productive in such a way that it allows to reach the necessary growth to really achieve the proposed goal, since habitually, the companies do not have the habit of innovating nor the culture of the innovation something that can hinder this objective, since usually, the companies do not have

After reviewing pillar 12 in the World Economic Forum Competitiveness Report [9], a pillar that considers innovation

the habit of innovating nor the culture of the innovation something that can make difficult this objective.

The most recent Dane Technological Development and Innovation Survey (Edit) see Figure 5 indicates four types of companies according to the innovation results obtained: a) innovators in the strict sense, b) innovators in the broad sense, c) potentially innovators, and d) non-innovators [13-14]. In which research and development centers make up most innovative companies in the strict sense within their subsector (5.0%) and potentially innovative within their subsector (10.0%), while banking activities present the greatest proportion of innovative companies in the broad sense (84.0%). On the other hand, retail trade activity presents the highest percentage (89.2%) as non-innovative companies.

All this indicates that approximately 32% of the country's companies invest and allocate resources for innovation; which would indicate that around 67% do not make even a minimal investment in innovation, i.e. they still do not see in innovation the path for its growth and sustainability.

3.1 Plan and Recommendations to Promote the Culture of Innovation

In order to design a plan that promotes the culture of innovation in organizations, see Fig 6, it is necessary as a first step to make a diagnosis that allows to know the current culture of the company in order to identify which factors support or hinder innovation, then create a multidisciplinary team to work in the generation of ideas and good practices, then evaluate and select those ideas with greater potential and that may benefit the company. Finally, work with prototypes or pilots in a specific area that allows you to adjust, provide feedback in order to minimize the risk of failure and maximize the success of the cultural process before deploying it in all areas of the company [15-16].

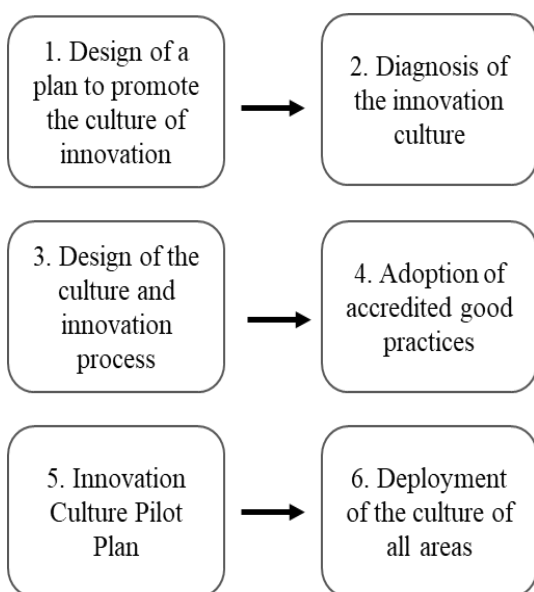


Fig. 6. Plan to promote culture of innovation in the company

4. RECOMMENDATIONS

Once the analysis aimed at recognizing the appropriate culture of innovation at the business level in Colombia is completed, the high degree of ignorance regarding the subject is identified and the little commitment incurred by organizations to promote change is therefore given recommendations on the following aspects:

- Motivate the work team so that they feel ambassadors of innovation in front of other colleagues; do not be afraid of failure.
- Although there are some common and transversal elements to generate an innovative culture, it is necessary for organizations to build their own strategy that adapts to the needs and environment.
- Establish priorities, that is, look for ideas adapted to what you are really looking for.
- Have clarity about how innovation will help improve, differentiate, add value and make their organizations profitable.
- Manage blackheads or toxic elements; refers to those people who do not allow progress.
- Implement tools that promote the active participation of workers to generate innovative ideas and strategies.
- Reject the single thought, to facilitate different lines of constructive thought, considering the contribution made by all the members of the work team.

5. CONCLUSIONS

The process of managing the culture of innovation in organizations not only allows them to be at the forefront and highly competitive in the market, but also contributes greatly to the technological development of a country as it allows through the contribution of various Colombian economies, synergies are generated that facilitate accelerate the stages of the innovation cycle leading the country to have a healthy and efficient innovation ecosystem, i.e. the country is able to combine quality and inputs to obtain effective and differentiating results.

In the same way, innovation is a central engine of economic growth that involves significant changes that can improve or transform the current business model of an organization, allowing it to achieve a reduction in levels of uncertainty while also optimizing and increasing productivity in order to obtain better products and processes. All this contributes to the timely making of strategic decisions that in this order of ideas increases performance and strengthens innovation systems at the national level.

Therefore, regardless of the size of the organizations, they must design and adopt a plan that allows them to develop and exploit that innovative culture in order to reinforce those factors that may hinder their growth, or else they will be destined to be absorbed by those organizations that did choose to innovate and increase their business management culture making them more profitable and strong.

REFERENCES

- [1] Cornell University, INSEAD, and World Intellectual Property Organization. 2018. The Global Innovation Index 2018: Energizing the World with Innovation. Ithaca, Fontainebleau, and Geneva.
- [2] Departamento Nacional de Planeación. 2018. Índice Global de Innovación, Informe para Colombia.
- [3] Jacinto, E., Montiel, H., Martínez, F. 2018. Use of Management Tools for the Development of Technological Innovation Processes in Organizations. In International Journal of Applied Engineering Research, 13(10), pp. 8311-8314.
- [4] Rao, J. and Weintraub, J. 2013. How Innovative Is Your Company's Culture?, In MIT Sloan Management Review, 54 (3), pp. 29-37.
- [5] AEC Asociación española para la calidad. 2014. Manifiesto Cultura de Innovación. Madrid, España.
- [6] Organización para la Cooperación y el Desarrollo Económico OECD/Eurostat. 2018. Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris/Eurostat, Luxembourg.
- [7] Valle, S., Vázquez, D. 2009. Concurrent engineering performance: Incremental versus radical innovation, In International Journal of Production Economics, 119 (1), pp. 136-148.
- [8] Damanpour, F. and Wischnevsky, J. 2006. Research on innovation in organizations: Distinguishing innovation-generating from innovation-adopting organizations. In Journal of Engineering and Technology Management, 23(4), pp. 269-291.
- [9] Asociación Nacional de Empresarios de Colombia ANDI. 2018. Cierre de brechas de innovación y tecnología. Medellín, Colombia.
- [10] Schwab, K. 2018. The Global Competitiveness Report 2018. World Economic Forum. Geneva, Switzerland.
- [11] Financial Advisory & Infrastructure (FAS) - Deloitte. 2018. Reporte Global de Competitividad 2018-2019 Datos y conclusiones clave del informe del Foro Económico Mundial. Costa Rica.
- [12] UNESCO. 2015. UNESCO Science Report: towards 2030. Paris, Francia.
- [13] Departamento Administrativo Nacional de Estadística (DANE). 2018. Encuesta de Desarrollo e Innovación Tecnológica en los sectores Servicios y Comercio (EDITS) 2016 – 2017. Bogotá, Colombia.
- [14] Departamento Administrativo Nacional de Estadística (DANE). 2017. Encuesta de Desarrollo e Innovación Tecnológica sector Industria Manufacturera (2015-2016). Bogotá, Colombia.
- [15] Salomo, S., Weise, J. & Gemünden, H. 2007. NPD Planning Activities and Innovation Performance: The Mediating Role of Process Management and the Moderating Effect of Product Innovativeness. In Product innovation management, 24(4), pp. 285-302.
- [16] Gërguri- Rashiti, S., Ramadani, V., Abazi- Alili, H., Dana, L. & Ratten, V. 2015. ICT, Innovation and Firm Performance: The Transition Economies Context. In Thunderbird International Business Review, 59(1), pp. 93-102.